RIVERS AND FLOODS, JULY, 1919.

ALFRED J. HENRY, Meteorologist in Charge.

For the first time in several months precipitation was so heavy and continuous as to cause heavy run-off and consequently much flooding in the streams of the Atlantic Drainage south of the James River, including the Flint and Chattahoochie Rivers of Georgia.

The rains began quite generally over the Appalachian region on the 16th and continued uninterruptedly over some portions until the 26th. Fortunately they ended over the mountain districts of Virginia and western North Carolina on the 22nd, although heavy rains fell after that date on the lowlands of North Carolina, South Carolina, and Georgia.

The soil was moderatley dry except in the southern part of the region and the run-off was not particularly heavy until the rains had continued about four days.

While the rainfall was not uniformly heavy over the region as a whole, the light rains served to keep the streams at a "near" flood stage. Heavy rains—an inch or more in 24 hours—fell in some portions of the region on the 16th, 17th, 18th, 19th, 20th, 22d, and 23d, and it was to these local downpours that the floods were in the main due. The Roanoke, Tar, Neuse, and Cape Fear Rivers of North Carolina were 10 to 15 feet above flood stage at one or more gauging points, the highest stage of record being reached on the Tar River at Tarboro on the 27th. Record stages of 24.8 feet at Neuse, N. C., and 26.4 feet at Smithfield, N. C., on the Neuse River, were reached on the 24th. Agricultural interests in the lowlands of eastern North Carolina suffered heavy loss.

The floods in the rivers of South Carolina and Georgia were not quite so severe as in North Carolina, the excess above flood stage ranging from 2 to 9 feet.

Heavy local and general rains in the last part of June caused a flood in the upper Trinity River of Texas. This flood passed down the lower Trinity from July 1 to 7. The Guadalupe, Neches, and Colorado Rivers of Texas were in flood locally at various times during the month due to heavy rains. The lower Rio Grande was in flood from the 24th to the end of the month, also in New Mexico on the 16th.

In all other districts floods were local and unimportant except that a severe local flood occurred in the outskirts of Dubuque, Iowa, on the 9th, the particulars of which have been furnished by Mr. J. H. Spencer, official in charge of the Dubuque, Iowa, Weather Bureau Office. (See also p. 468 above.)

Union Park, a pleasure resort on the outskirts of the city, to the northwest, is a narrow valley only a few hundred feet wide in places with steep hills on either side. Running through the valley is a creek, which is practically dry except during wet periods. During the period of excessive rainfall on July 9 this creek became a raging torrent many feet deep, overflowing its bank and destroying park property of all kinds. A number of picnickers took shelter from the rain in a pavilion near the creek. The rising waters quickly flooded the building and finally swept it away, precipitating its occupants into the freshet. In spite of heroic deeds upon the part of the park employees and others, five persons were drowned here or elsewhere in the park. Property loss at Union Park is estimated at from $10,000 to $15,000.

Another tragedy occurred on Thirty-second Street, near Heims' brickyard. Mrs. George Kennicker and two small children attempted to cross the street and the woman and one child were swept by the torrent of water into the Bee Branch sewer and drowned. The other child was carried over the mouth of the sewer and escaped, but with serious injuries.

The damage to waterway streets and to many streets on the level below the bluffs was surprisingly great. Kaufmann Avenue was completely ruined and also West Locust Street between Jackson School and Mount St. Joseph College. Julien Avenue and Dodge Street were badly damaged. Much of the brick paving on Eighth Street for several blocks above Bluff was stripped off and thousands of brick carried down by the water to the business section of the city. The wood-block paving for several blocks on Couler Avenue above Eighteenth Street was carried away and the avenue over this area was a wreck after the storm. Some of the streets below Main, particularly from the Carr, Ryder & Adams Co. factory northward to the Brunswick-Balke-Collender Co. factory, were covered with water during the height of the storm; water in large areas was 2 to 3 feet deep. Hundreds of cellars were flooded and some were completely filled with water and mud, the water reaching to the first floor in many instances. These were only typical instances of the damage of the storm. Few sections of the city from Eagle Point and the Brunswick-Balke-Collender Co. factory on the north to Dodge Street and the lumber yards on the south—a distance of about 4 miles—escaped damage.

City officials estimate that the streets of the city were probably damaged to the extent of $75,000 to $100,000. This may be correct, because many thousands of dollars will be required to clean and repair the streets, while some are beyond repair and will have to be replaced. There are hundreds of individual losses relatively small. Counting damage to city streets and at Union Park and individual losses, a conservative estimate of total damage would be $100,000.

* * * * *

Quite general and heavy rains occurred over southwest Texas on the 19th, 20th, and 21st. Nearly 10 inches of rain fell in Austin in a little more than 3 hours, almost equaling the so-called cloudburst of April 22, 1915, when 31 lives were lost as a result of local overflows. While much damage was done to bridges and roadways, the success of a large forage crop in west Texas was assured.

A severe local flood due to a 24-hour rain of 10.89 inches, 9.10 inches of which fell in 6 hours, on the early morning of the 19th occurred at Gainesville, Tex., where the flood waters of Pecan Creek overspread a good part of the town. Beyond damage to streets, bridges, and the lower floors of buildings, there was no material loss. Crops in the field, however, suffered heavy loss, in some cases being entirely destroyed.

On the 22d a heavy local rain in Tioga County, Pa., caused a destructive overflow on Morris and Jackson Creeks running through the town of Wellsboro. Very much damage was done in the latter to roads, bridges, buildings, and public utilities. Crops were destroyed in the county and transportation was seriously interrupted.

Estimated loss by flood, July, 1919.

District.	Tangible property, bridges, etc.	Crops.		Live stock and other farm property.	Suspension of business.	Estimated value of warnings.
		Prospective.	Gathered.			
Richmond, Va.	6,309	.....	.....	.....	5,255	10,000
Raleigh, N. C.[1]	250,000	3,000,000	60,000	.....	200,000	360,000
Columbia, S. C.	19,600	406,500	15,700	4,875	17,540	462,750
Charleston, S. C.	7,500	105,000	20,000	950	63,000	50,000
Atlanta, Ga.	[2]	.....	.....	.....	.....	.....
Macon, Ga.	[2]	.....	.....	.....	.....	.....
Houston, Tex.	40,000	10,000	10,000	.....	500	100,000
Dallas, Tex.	8,000	220,000	15,000	500	.....	40,000
Total.	331,409	3,741,500	120,000	6,325	286,295	1,022,750

[1] To be reported later. [2] Nominal.

TABLE I.—*Flood stages in the Atlantic drainage during month of July, 1919.*

River and station.	Flood stage.	Above flood stages—dates.		Crest.	
		From—	To—	Stage.	Date.
Pompton:	*Feet.*			*Feet.*	
Pompton Plains, N. J.	8	.....	.....	7.6	23
James:					
Richmond, Va.	10	21	23	12.1	22
Roanoke:					
Randolph, Va.	21	20	21	23.5	21
Weldon, N. C.	30	18	26	45.2	23
Dan:					
Danville, Va.	8	21	21	9.4	21
Clarksville, Va.	12	.....	.....	11.7	22
Tar:					
Rocky Mount, N. C.	9	21	27	15.5	24
Tarboro, N. C.	18	23	(1)	37.0	27
Greenville, N. C.	13	21	(1)	24.5	28
Fish-Creek:					
Enfield, N. C.	14	22	27	19.6	24
Neuse:					
Neuse, N. C.	14	9	11	15.7	10
Do.	14	17	27	24.8	24
Smithfield, N. C.	14	19	29	26.4	24
Cape Fear:					
Elizabethtown, N. C.	22	9	9	23.9	9
Do.	22	19	29	34.2	25
Fayetteville, N. C.	35	19	26	52.0	24
Haw:					
Moncure, N. C.	22	18	23	23.0	22
Peedee:					
Cheraw, S. C.	27	20	25	36.3	23
Lynches:					
Effingham, S. C.	14	26	31	16.0	29
Black:					
Kingstree, S. C.	12	26	30	12.4	27–28
Santee:					
Rimini, S. C.	12	(2)	4	14.2	3 30–1
Do.	12	11	14	12.8	12–13
Do.	12	19	(1)	23.3	26
Ferguson, S. C.	12	(2)	5	13.3	1–2
Do.	12	13	(1)	17.1	27
Catawba:					
Mount Holly, N. C.	15	20	20	17.0	20
Catawba, S. C.	11	20	23	20.8	23
Wateree:					
Camden, S. C.	24	20	25	33.0	21
Congaree:					
Columbia, S. C.	15	21	24	20.5	21
Broad:					
Blairs, S. C.	15	20	23	18.4	21
Saluda:					
Pelzer, S. C.	7	21	21	8.0	21
Chappells, S. C.	14	20	23	18.5	21
Edisto:					
Edisto, S. C.	6	23	(1)	7.8	26–28
Oconee:					
Milledgeville, Ga.	22	.....	.....	21.4	25
Dublin, Ga.	22	.....	.....	21.4	27
Ocmulgee:					
Macon, Ga.	18	.....	.....	16.5	25
Abbeville, Ga.	11	24	(1)	14.6	30

3 Continued into June. 2 Continued from June. 1 Continued into August.

TABLE II.—*Flood stages in the east Gulf drainage during the month of July, 1919,*

River and station.	Flood stage.	Above flood stages—dates.		Crest.	
		From—	To—	Stage.	Date.
Flint:	*Feet.*			*Feet.*	
Woodbury, Ga.	10	.....	.....	9.2	25
Montezuma, Ga.	20	27	27	20.0	27
Albany, Ga.	20	28	(1)	24.1	31
Bainbridge, Ga.	25	.....	.....	23.5	31
Chattahoochee:					
Eufaula, Ala.	40	.....	.....	39.8	26
Alaga, Ala.	30	26	28	35.3	27

1 Continued into August.

TABLE III.—*Flood stages in the Mississippi drainage during July, 1919.*

River and station.	Flood stage.	Above flood stages—dates.		Crest.	
		From—	To—	Stage.	Date.
Walhonding:	*Feet.*			*Feet.*	
Walhonding, Ohio.	8	.....	.....	11.8	20
Kanawha:					
Glenville, W. Va.	22	17	17	24.0	17
Elk:					
Clay, W. Va.	18	.....	.....	19.7	16
Gassoway, W. Va.	24	.....	.....	23.9	16
Illinois:					
Beardstown, Ill.	12	(1)	8	12.7	3–5

1 Continued from June.

TABLE IV.—*Flood stages in the west Gulf drainage during July, 1919.*

River and station.	Flood stage.	Above flood stages—dates.		Crest.	
		From—	To—	Stage.	Date.
Trinity:	*Feet.*			*Feet.*	
Dallas, Tex.	25	20	26	36.5	23
Liberty, Tex.	25	(1)	7	27.0	3–4
Trinidad:					
Trinidad, Tex.	28	29	(2)	32.4	31
Sabine:					
Bon Wier, Tex.	20	(1)	.....	19.0	1
Neches:					
Rockland, Tex.	20	(1)	4	23.2	1
Colorado:					
Columbus, Tex.	28	24	26	31.6	25
Guadalupe:					
Gonzales, Tex.	22	24	25	28.8	24
Victoria, Tex.	16	(1)	3	22.4	1
Do.	16	23	29	23.5	28
Rio Grande:					
Rio Grande City, Tex.	15	24	(2)	22.6	28

1 Continued from June. 2 Continued into August.

WATER SHORTAGE IN THE LOWER VALLEY OF THE COLORADO, JULY, 1919.

By F. H. BRANDENBURG, Meteorologist.

[Dated Denver, Colo., Aug. 8, 1919.]

The persistence of drought on the upper drainage of the Grand and throughout the drainage of the Green has had a marked effect on the discharge of the Colorado River. The winter's snow covering, having been much below the normal, sustained high temperatures during the latter part of May left but little for the summer run-off. Absence of rainfall on the watershed for several months was naturally reflected in the run-off, so that the Colorado reached a very low stage much earlier than usual. The volume discharged has been inadequate for the needs of the Imperial Valley which requires about 20,000 second-feet. This amount is less than the volume discharged in midsummer if not augmented by rainfall in Arizona and the mountain districts where summer rains, although local in character, are generally frequent and occasionally heavy. In the Palo Verde Valley 32,000 acres are under cultivation, 22,000 acres being in cotton, which will need another irrigation before the end of August.

MEAN LAKE LEVELS DURING JULY, 1919.

By UNITED STATES LAKE SURVEY.

[Dated Detroit, Mich., Aug. 5, 1919.]

The following data are reported in the Notice to Mariners of the above date:

Data.	Lakes.[1]			
	Superior.	Michigan and Huron.	Erie.	Ontario.
Mean level during July, 1919:	*Feet.*	*Feet.*	*Feet.*	*Feet.*
Above mean sea level at New York	602.58	581.34	573.45	247.75
Above or below—				
Mean stage of June, 1919	+ 0.13	− 0.16	− 0.32	− 0.20
Mean stage of July, 1918	+ 0.34	− 0.60	+ 0.86	+ 0.90
Average stage for July, last 10 years	+ 0.18	+ 0.45	+ 0.67	+ 0.96
Highest recorded July stage	− 1.24	− 2.24	− 0.96	− 0.97
Lowest recorded July stage	+ 1.10	+ 1.44	+ 1.99	+ 3.16
Average relation of the July level to—				
June level	.....	+ 0.1	− 0.1	− 0.1
August level	.....	0.0	+ 0.2	+ 0.3

1 Lake St. Clair's level: In July, 576.24 feet.